United Nations ECE/CES/2015/10

Economic and Social Council

Distr.: General
23 March 2015

Original: English

Economic Commission for Europe

Conference of European Statisticians

Sixty-third plenary session
Geneva, 15–17 June 2015
Item 6 (a) of the provisional agenda
Outcomes of the in-depth reviews carried out by the Conference of European Statisticians Bureau

In-depth review of process-oriented approach to statistical production

Note by the Turkish Statistical Institute

Summary

The present note is the in-depth review paper on the process-oriented approach to statistical production. The Bureau of the Conference of European Statisticians conducted the in-depth review at its meeting in February 2015. The purpose of the reviews is to improve coordination of statistical activities in the region of the United Nations Economic Commission for Europe, identify gaps or duplication of work, and address emerging issues.

The note summarises international statistical activities related to the process-oriented approach to statistical production, identifies issues and challenges, and makes recommendations for possible follow-up work.

The outcome of the review is provided in document ECE/CES/2015/10/Add.1.

GE.15-06099 (E)

1506099

Please recycle

I. Executive summary

1. Today's statistical organizations are facing many challenges such as rapidly changing technologies, increasing demands of the public for timely, relevant, up-to-date statistics and decreasing budgets. These factors put pressure on producers of official statistics to employ more skilled staff and to have better IT infrastructure. National statistics offices (NSO) also need to decrease the burden put on respondents through surveys. Therefore, producers of official statistics start looking for alternative sources of data, such as internet and other Big data sources. In order to gain a sustainable competitive advantage NSOs need to modernize the statistical production. As part of the modernization efforts, process-oriented approach to statistical production has become quite popular in recent years among NSOs as well as international organizations.

2. In process-oriented organizations the focus is placed on business processes, improvement of interdepartmental and cross-functional interaction. The goal is to optimize the execution of the whole process rather than optimizing parts of it. This can be achieved by a thorough understanding of end-to-end processes and production system as a whole.

3. The aim of the in-depth review is to take a closer look at the NSO's organizational structures, their approach to process management and process integration. Country practices, issues and challenges met while implementing the process-oriented approach and lessons learned are also included in this in-depth review.

4. In order to evaluate the process-oriented approach in official statistics industry, TurkStat prepared an online survey to measure the NSOs' tendency toward process-oriented statistical production. The survey consists of 28 questions. The questions are mostly Likert type questions. The survey was sent to statistics offices of the member countries of the United Nations Economic Commission for Europe (UNECE) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). In total, 31 countries out of 95 responded to the survey; a list of these NSOs is provided in the Annex.

5. Various dimensions of process orientation were taken into account in the survey and questions were asked to determine how NSOs rate themselves in these dimensions. Based on the findings of the survey, it would not be wrong to say that most organizations which responded to the survey have a vision to move towards a more process-oriented statistical production. However, it was also seen that, even the organizations which are most committed to streamlining the statistical processes have not completed statistical workflow management systems, the end-to-end standardisation, orchestration and automation of statistical processes.

6. The paper summarizes the findings of the survey reflecting the overall situation of the responding organizations, along with specific selected country experiences regarding the implementation of process-oriented approach. There could be a non-response bias in the survey results, since only one third of countries responded to the survey; i.e. there might be meaningful differences between the answers of respondents and the potential answers of non-respondents. For instance, countries which responded to the survey might be more advanced in process orientation.

II. Introduction

7. The Bureau of the Conference of European Statisticians (CES) regularly reviews selected statistical areas in depth. The aim of the reviews is to improve coordination of statistical activities in the UNECE region, identify gaps or duplication of work, and address emerging issues. The review focuses on strategic issues and highlights concerns of

statistical offices of both a conceptual and a coordinating nature. The current paper provides the basis for the review by summarising the international activities in process-oriented approach to statistical production, identifying issues and problems in this approach, and making recommendations on possible follow-up actions.

8. As a result of technology revolution and organizational changes, the organizations today are under the pressure of transforming and modernizing their processes and technologies to meet new demands. Moving from the traditional current state to a more process-oriented organization is a complex, costly and time consuming effort. It is costly in terms of the time it takes, the investments that need to be made in machines and tools as well as skilled labour.

9. The capability of management to orchestrate the individual components of the system – the IT department, the subject matter departments, the business analysts and others involved in the production process – is the most important factor for successful implementation of process management. It is essential that organization has a vision, strategy and strong commitment from the leadership to move in that direction.

10. This paper summarizes the experiences of NSOs with regard to process orientation. The following section III introduces types of organizational structures, definitions of stovepipe and process-oriented approach and discussions in the literature with regard to these approaches. Section IV summarizes information received on the modernization activities of international organizations. Section V describes country practices using the results of the survey and provides some specific examples of the implementation of process-oriented approach within NSOs. Section VI describes issues, challenges and the difficulties met by NSOs while implementing a more process-oriented approach in statistical production. The last section makes proposals for the way forward.

III. Attributes of organizational structures

A. Organizational structure types

11. The organizational structure defines how people in an organization are grouped together to achieve its goals. The organizational chart shows the structure of organizations and specifies the hierarchy of the organization, including who reports to whom.

12. In organization theory the basic types of organizational structures are defined as functional, divisional and matrix organizations. Definitions of these structures are as follows:

13. Divisional structure: A division is a collection of functions which produce a particular product. The divisional structure or product structure consists of self-contained divisions. This type of structure is closer to stovepipe structuring, where units are based on statistical domains, responsible for production of a certain product.

14. Functional structure: In functional organizations units are based on functions. In case of NSOs, these functions could be specified as data collection, processing, dissemination etc.

15. Matrix structure: This type of structure is a mix of functional and divisional organizational structure, usually with dual reporting lines. J. Galbraith says "A matrix is a type of organizational structure that is built around two or more dimensions, such as

functions, products or regions, and in which people have two bosses."[1] Matrix is considered as a more suitable structure for process-oriented production; it also supports the organizations in moving to that direction.

16. These three, most common basic types of organization were used to classify the organizational structures of NSOs. Although divisional structure is associated or matched with stovepipe organization; and matrix structure is associated with process-oriented organization; the match is usually not exact but rather it is based on some degree of overlap. Process-oriented and stovepipe structures generally appear as an additional layer on top of the existing structure and can be observed in the actual functioning of the organization.

B. Stovepipe organization versus process-oriented approach

17. The definition for "stovepipe organization" from Wikipedia[2] is as follows:

"A stovepipe organization has a structure which largely or entirely restricts the flow of information within the organisation to up-down through lines of control, inhibiting or preventing cross-organisational communication. Many traditional, large (especially governmental or transnational) organisations have, or risk falling into having, a stovepipe pattern. Intelligence organisations may deliberately adopt a stovepipe pattern so that a breach or compromise in one area cannot easily spread to others."

18. The definition of "process-oriented organization" is as follows[3]:

"An organization that emphasizes process as opposed to hierarchies, a process-oriented way of thinking, outcomes and customers."

19. The metaphor of stovepipes and silos in government has been around for a long time. It is argued that these structures bring isolationism within organizations and create an environment that limit organizations' ability for seamless production. Stovepipe systems result in a sub-optimal solution where parts may be improved without taking the whole functioning into consideration. The whole functioning of the organization may be improved or degraded as a result. Also, interdepartmental competition might result in an "I win, you lose" type of behaviour which would negatively impact the overall performance of the organization.

20. Stovepipe and silo organizations share a common characteristic: the left hand does not know what the right hand is doing. The symptoms of the silo effect are easy to recognize: lack of cooperation, internal competition, breakdown in communication, duplication and redundancy of work. On the other hand, a silo can become useful if they are used to concentrate on well-framed, truly separate issues. In fact, silos are necessary in some secure facilities, such as intelligence organizations.

21. Stovepipes and silos may exist no matter how the organization is structured. Therefore, looking for a structural solution for silos may not always be the right approach. Creating bridges across silos, improving communication between departments and ensuring that they are working efficiently toward the same goals are more important than the structure of the organization. If there is an organization wide encouragement to work well across divisions, then silos could disappear. In addition, process improvement and re-engineering also bring a widespread change in the organization and organizations move toward a matrix or process based functioning.

[1] "Designing matrix organizations that actually work", Jay R. Galbraith, Wiley 2008, page 3.
[2] http://en.wikipedia.org/wiki/Stovepipe_(organisation)
[3] http://en.wikipedia.org/wiki/Business_process_orientation

C. Dimensions of process orientation

22. As it was mentioned in previous sections of this paper, process-oriented organizations cannot be defined with a particular type of structure, but there are certain characteristics that make organizations process-oriented. These characteristics make up the dimensions of process orientation for organizations. Some of the most important dimensions are evaluated below.

1. Organizational structure

23. The discussion on alternative forms of organization focuses on the idea that the best structure supports the agility of organization and enables an organization to learn faster, execute better and change more easily. Even though process-oriented organizational structure is not clearly specified or classified among the types of structures in organization theory, there are some factors that help make an organization a process-oriented one. Process-oriented organizations focus on the optimal coordination and operation of the processes, there is cross-process integration so that the structure and processes are well aligned. The organizational structure of process-oriented organizations may vary with process management as an additional dimension to the structure.

24. Matrix structure is suggested as a suitable structure for process-oriented organizations. It groups employees both by function and division and manages individuals with more than one reporting line. This structure combines two different organizational approaches that coexist, for example silos and process-oriented activities. Matrix structure allows breaking traditional vertical silos of product and geography, to deliver work processes across the whole business more effectively and to be able to respond more flexibly.

25. In his book *Designing Matrix Organizations That Actually Work* Jay R. Galbraith[4] says "Organizational structures do not fail, but management fails at implementing them successfully." He argues that the matrix has become a necessary form of organization in today'. business environment. According to Galbraith, a complete design of the matrix organization aligns structure, goals, processes, rewards and people practices.

26. There may also be some difficulties in implementing the matrix structure. The structure is based on dual focus and dual responsibility, but dual reporting lines could blur the reporting relationship, bring some conflict, make coordination more difficult and lead to lower productivity. When there are multiple supervisors, there could be multiple and conflicting agendas and lack of clarity with priorities. This could be confusing for middle management and employees.

2. Process identification and documentation

27. One of the first steps in becoming a more process-oriented organization is to identify and document the processes within the organization. Only that allows analysing processes, monitoring process performance and taking the necessary measures to correct and improve processes. Process optimisation can be done when the problem is identified and the goals are defined and set.

3. Information technologies

28. Information technologies are an essential component of process management. "As the key processes were identified and their objectives determined, the company began to

[4] "Designing Matrix Organizations That Actually Work", Jay R. Galbraith, Wiley 2008

think about how information technology (its own and from other providers) could enable and support the processes. (Davenport & Short 1990)"[5].

4. Leadership and process ownership

29. Another important factor is the support and commitment of the management and senior executives. Process-oriented approach cannot be implemented without leadership. Management's commitment is essential for promoting a culture based on teamwork and collaboration across units. Process focused senior executives translate plans into process performance requirements rather than functional assignments.

5. Organizational culture

30. Organizational culture and organization wide understanding of process management requires focusing on the horizontal flow of work rather than on vertical hierarchies of control and communication. Also organization's culture of performance measurement needs to shift from individual recognition to process excellence.

31. Strong teamwork culture is an element of process-oriented organizations. Those organizations need to have or need to develop a culture aligned with their processes to have good coordination within and across process teams inside the organization.

32. Staff's awareness of processes and use of process terminology in everyday work is also an indicator of process-oriented organizational culture.

IV. International activities relating to process orientation of statistical production

A. UNECE, Conference of European Statisticians

33. Since 2010, the High-Level Group for the Modernisation of Statistical Production and Services (HLG) promotes standards-based modernisation of statistical production and services aiming at improving the process of statistical production. The mission of HLG is to oversee development of frameworks, and sharing of information, tools and methods, which support the modernisation of statistical organizations. The aim is to improve the efficiency of the statistical production process, and the ability to produce outputs that better meet user needs.

34. The High-Level Group has produced a strategic vision, which was adopted by the CES in June 2011, and a strategy to implement that vision, which was adopted by the CES in June 2012.

35. HLG defined its strategy in two directions:

(a) Statistical output: New and better products and services more tuned to the way the world is operating today, and created from a global perspective. This will help us to stay relevant;

(b) Production methods: Different and better processes and methods tuned to delivering our products at minimal cost with greater flexibility and in cooperation between institutions. This will help us to improve efficiency and effectiveness.

[5] "The New Industrial Engineering: Information Technology and Business Process Redesign" Thomas H. Davenport, James E. Short, MIT, June 1990

36. The strategic vision of HLG states that "Each statistical organization is a factory of statistical information. Together these statistical organizations form the 'official information' industry. Like any established industry, the production of official statistical information should have its own industrial standards. On the one hand, this will provide a necessary foundation for development and exchange of the means of production among the statistics producers, and potentially create a market of commercial interest to our benefits. On the other hand, this will consolidate the use of our statistical outputs in the global information community, making them readily accessible, interpretable and comparable".

37. Four modernization committees are now working under HLG to achieve the HLG strategy. These modernization committees are: Framework and evaluation, Production and methods, Products and sources, and Standards.

B. ESCAP, Committee on Statistics

38. The ESCAP Committee on Statistics established the Strategic Advisory Body for the Modernization of Statistical Production and Services in Asia and the Pacific SAB-AP in December 2012. The main objective is to drive and support changes towards the modernization of statistical products and services though developing a regional strategy for the Asia-Pacific, mobilizing financial and human resources, acting as a regional voice on the issue of modernization, and providing strategic direction to the work of experts groups addressing specific issues related to modernization.[6]

39. SAB-AP aims to raise awareness and build capacity related to concepts, methods and standards to support national efforts in modernizing statistics. These efforts also include the use of non-traditional data sources, such as Big data sources to produce official statistics.

40. SAB-AP works in regular consultation and coordination with related initiatives undertaken in other regions, notably HLG and its modernization committees. Taking into account the regional perspective, it will support the implementation of standards developed by HLG, such as the Common Statistical Production Architecture (CSPA), the Generic Statistical Business Process Model (GSBPM) and the Generic Statistical Information Model (GSIM).

C. European Commission

41. The European Statistical System (ESS)[7] functions as a network in which Eurostat's role is to lead the way in the harmonization of statistics in close cooperation with the national statistical authorities.[8] The ESS Vision 2020[9] builds upon a holistic approach to reach quality and efficiency gains. It embraces the opportunities provided by the digital transformation and emerging data sources; puts quality as an overarching element in the statistical production process; suggests new modes of collaboration and emphasizes the importance of dissemination and user engagement to drive continuous improvements. In this vision, the focus is placed on the mechanisms for collaboration and capacity-building

[6] http://www1.unece.org/stat/platform/display/msisap/SAB-AP

[7] The European Statistical System (ESS) is a partnership between the EU's statistical authority, i.e. the Commission (Eurostat), and the national statistical institutes as well as other national authorities responsible for the development, production and publication of European statistics in member nations.

[8] http://ec.europa.eu/eurostat/web/european-statistical-system/overview

[9] http://ec.europa.eu/eurostat/documents/10186/756730/ESS-Vision-2020.pdf/8d97506b-b802-439e-9ea4-303e905f4255

as well as on the changes that need to be made in the infrastructure and supporting frameworks to create a statistical system that is "fit for the future".

42. Key objectives of the ESS modernization initiatives are to improve quality and branding of the products; improve innovation and agility in producing statistics and to improve the overall efficiency of statistical production in Europe.

V. Country practices

43. In order to evaluate NSO's approach to process-oriented statistical production, and include the findings in this in-depth review TurkStat undertook a survey in November 2014. An on-line questionnaire was prepared and sent out to statistics offices of 95 UNECE and UN-ESCAP member countries. TurkStat shared the draft questionnaire with the members of the Modernisation Committee on Standards to receive their feedback prior to sending it.

44. The survey contains 28 questions measuring different dimensions of process-oriented approach, such as organizational structure, documentation of processes, process modelling, process ownership, organizational work culture and use of IT as an enabler of process management. The response rate to the survey is 32 per cent, 31 out of 95 NSOs responded to the survey. Since the response rate is not very high, there could be a non-response bias in the survey; i.e. there might be meaningful differences between the answers of respondents and the potential answers of non-respondents. For instance, countries who responded to the survey might be dealing with the process modelling and process standardisation more than the ones who did not respond to the survey (or vice versa). However, the survey responses provide a good basis for analysis.

A. Results of the survey on the "Process-oriented Approach to Statistical Production"

45. Organizational structure is one of the several dimensions of process-oriented organization. Three main types of structures are determined and used in this study to categorize the organizations (see section III. A. for definitions and types of organizational structures).

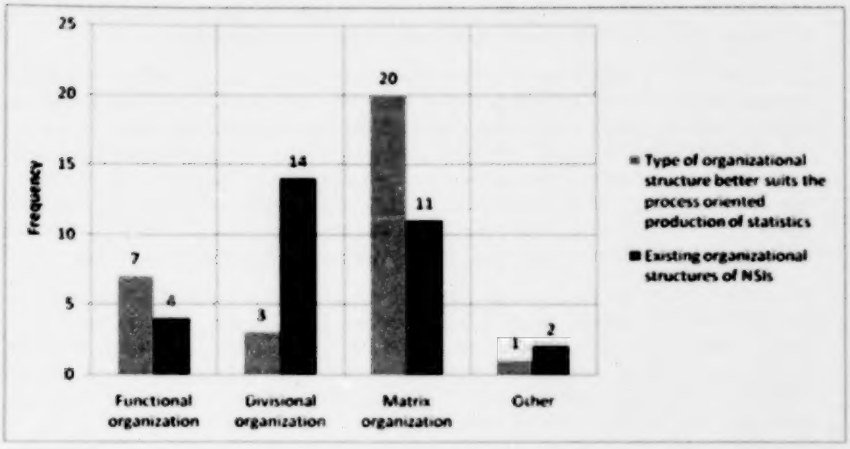
46. In the survey a general question of "*What type of organizational structure better suits the process oriented production of statistics?*" was asked. Two thirds of NSOs who responded to the survey said that the matrix organization suits the process-oriented production better. Functional organization and divisional organization was chosen by only one third of organizations (see Chart 1). An NSO answered the question as "It depends on the organisation itself and what fits with tradition and culture and what one would like to achieve with the process orientation." NSOs also consider cross-process integration as an important element for efficient statistical production in addition to the organizational structure.

47. In order to get information about the organizational structure of NSOs, the survey asked *whether the organization was structured functionally, divisionally, matrix or in another form* (see Chart 1). Most NSOs said that their organizational structure is divisional, i.e. units are based on statistical domains, products or regions with vertical orientation. Second most widely seen structure among NSOs was the matrix structure. NSOs explained their matrix structure as a mix of functional (such as methodology, data collection, dissemination and IT) and divisional structures (statistical domains, subject matter departments). However, this does not necessary indicate process orientation and it was not

clearly stated whether there are dual reporting lines within the structure. Only a few NSOs classified their organizations as functionally structured.

Chart 1

Organizational structures that NSOs reported as better suiting the process-oriented statistical production; and existing organizational structures of NSOs (number of responses)



48. A Likert type question of "*your organizational structure is derived from organization's business processes*" was asked on a four point scale from strongly agree to strongly disagree. Approximately two thirds of NSOs (23 of 31) either *strongly agree or tend to agree* that their structure is derived from processes; and eight organizations *disagree* with the argument that their organizational structure would be derived from processes.

49. Another important aspect of process orientation is identification and documentation of key business processes. In order to manage the processes NSOs need to clearly define and document the statistical processes that are performed within the organization. Based on the findings from the survey, almost all of NSOs *strongly agree or tend to agree* that their processes are clearly defined. When it comes to process documentation and updating the documentation most organizations only *tend to agree* that this is done.

50. Organizational culture has a big impact on process orientation. Problems during the implementation of process-oriented approach usually arise due to the work culture. Process-oriented organizations typically have an established teamwork culture. Process orientation also requires efficient flow of information so that the processes are integrated across different departments of the organization. In the survey, NSOs were asked if their organization has a strong teamwork culture, and whether the information flow through statistical processes is efficient. Most NSOs *tend to agree* that their organization has a strong teamwork culture with only a few NSOs indicating that they *strongly agree*.

51. Process ownership is seen as another dimension of process orientation. When NSOs were asked if there is any responsible unit or senior executive responsible for process management, half of the NSOs said that there are assigned process management responsibilities and the other half said there are none.

52. Statistical business process models are used by most NSOs to describe statistical business processes. When NSOs were asked if they use a statistical business process model to map their processes, 24 of 31 organizations answered "yes" to this question. Among the

ones who use a process model, 17 organizations use either GSBPM or country version of GSBMP, whereas 7 countries use their own process models.

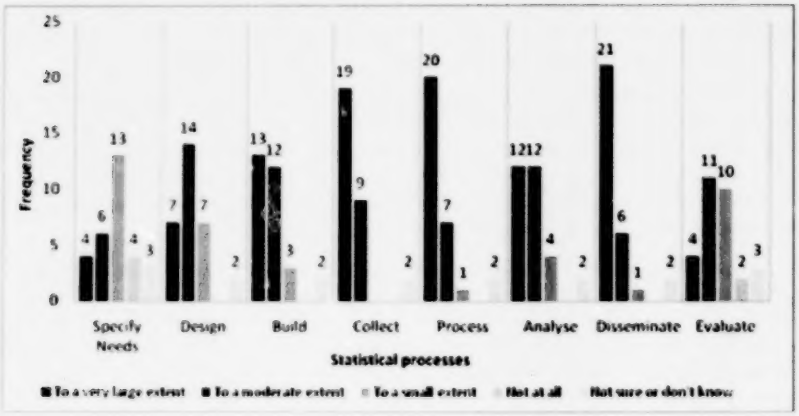
53. High level modelling of statistical business processes is done using GSBPM or NSOs own models. The business process model and notation (BPMN) software was used as a tool for process modelling by one third of the NSOs.

54. Information technology is an essential ingredient of process orientation. IT is needed as an enabler of process management, to model, standardise, improve and automate the processes. 24 out of 31 NSOs use IT as an enabler of process management.

55. NSOs were also asked to what extent they use IT as an enabler of process management for each of the eight phases of GSBPM[10] as well as for support processes on human resources, finance and training. Again a Likert type question was used, scaling from "to a large extent" to "not at all". NSOs reported using IT from *a moderate extent* to *a large extent* as enabler of process management for both statistical and non-statistical processes. The Likert scale score for statistical processes (GSBPM phases) is relatively higher than for non-statistical processes i.e. NSOs use IT for statistical processes *to a very large extent* while they use it for non-statistical processes *to a moderate extent* (See Charts 2 and 3).

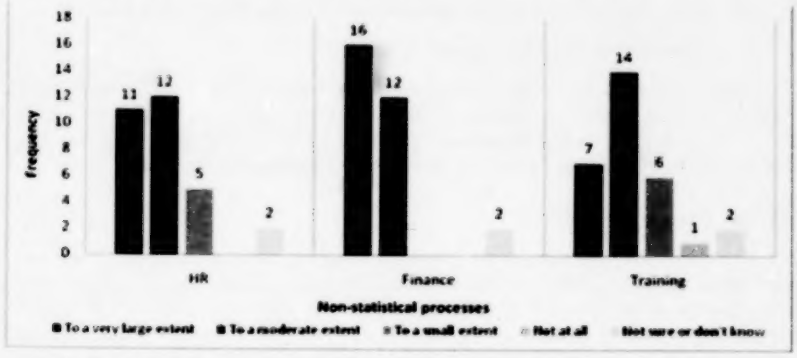
56. Most NSOs use IT *to a large extent* for the work process phases called "collect", "process" and "disseminate" (as in GSBPM), and less for other work process phases. IT is used to a lesser extent in "analyse" phase compared to the other three operational phases. In "build" and "analyse" phases IT is generally used from *a moderate to large extent*. In "design" and "evaluate" phases most NSOs indicate that IT is used *to a small to moderate extent*, in "specify needs" phase IT usage goes down to a small extent (see Chart 2).

Chart 2
Use of IT as an enabler of statistical business processes



[10] GSBPM phases: Specify Needs, Design, Build, Collect, Process, Analyse, Disseminate, Evaluate.

Chart 3
Use of IT as an enabler of non-statistical processes



57. Customer/user orientation is a very important dimension of process-oriented work. User satisfaction surveys are used to get users feedback on products and processes and to improve them. Almost all responding NSOs regularly carry out user satisfaction surveys and report that the survey results have an impact on products or processes. Mainly the results of user satisfaction surveys impact dissemination types and channels, and also the product portfolio.

58. Process performance measurement is done by all NSOs to some extent. Almost all of NSOs collect process performance data either periodically or from time to time. Performance indicators are specified from a small to moderate extent, and these indicators are based on both organization's goals and customer requirements.

59. More than half of the organizations make use of process improvement methodologies such as International Organization for Standardization (ISO), six sigma, Total Quality Management (TQM) and European Foundation for Quality Management (EFQM).

60. A direct question about process orientation was asked to NSOs. Two thirds of NSOs *tend to agree or strongly agree* that they have a process-oriented approach to statistical production; while one third of NSOs *disagree*. NSOs also mentioned that this approach helps to improve the quality of their products.

61. NSOs state that process-oriented approach and initiatives taken to standardise and improve the processes result in improvements in data collection, data processing and metadata systems. In addition, NSOs report that process orientation has reduced the cost of producing statistics.

62. More detail about NSOs' experience regarding the implementation of process orientation is provided in the following section of the document.

B. Implementation of process orientation, lessons learned from NSOs' experience

63. This section addresses the experience of selected NSOs in the following issues:

(a) How was process-oriented approach implemented in organizational structure?

(b) What was the impact of process-oriented approach on products and production?

(c) What were the difficulties met while implementing and applying the process-oriented approach?

(d) How did process-oriented approach impact organization's work culture?

(e) Lessons learned during the implementation.

64. The responses given to the above questions provide highlights in implementing a process-oriented approach in NSOs. This information could be useful for other organizations intending to move towards process-oriented organization of work. The section reports the responses of six NSOs who agreed to disclose their answers.

1. Australian Bureau of Statistics

65. Structural implementation: An important aspect was introducing functional specialisation for key phases of the statistical business process (e.g. "collect" and "disseminate") to serve the needs of all statistical programs within the Australian Bureau of Statistics (ABS). Other phases (e.g. "specify needs", "design", "process", "analyse" and "evaluate") are still conducted by subject matter statisticians but increasingly make use of shared statistical frameworks, methods, process patterns and processing platforms.

66. Impact on products and production: If ABS had not moved toward a process-oriented approach it would no longer be possible to produce the range of products ABS currently produces (across 177 statistical programs). A range of savings were made in regard to production. It also became more feasible, although still not easy, to manage the transition to updated technology within the statistical process, such as e-forms.

67. Difficulties while implementing: Transition of business activities to a process-oriented approach usually took longer, and proved more complex, than originally envisioned. Functions which had not been well delineated from each other previously needed to be formalised and separated. Analysis and discussion was required to clarify whether more generic processes and methods met the business needs of the specific statistical program to a sufficient level. Staff needed to be retrained, and redeployed in some cases, as their roles changed.

68. Impact on work culture: The transition period placed pressure on work culture. This was managed carefully via human resources strategy. Following the transition, staff generally found that their role included less manual tasks that were very detailed and routine. They had more time available for higher level tasks such as analysis and innovation. There was also more emphasis on different parts of the organisation working together in practice to achieve results compared with more "stove-piped" working arrangements in the past. In general the change in work culture was positive.

69. Lessons learned: A process-oriented approach adds value but a lot of care, cooperation and shared commitment is required across the organisation to design the new approach, manage the transition and achieve the desired outcomes in practice. Due to the extent of change required, a number of substantial steps toward achieving a process-oriented approach may be preferable in practice to seeking to achieve the transition in a single large step. Having achieved process orientation to a moderate degree ABS is now well placed to strengthen the approach.

2. The Census Bureau, United States

70. Structural implementation: Some organizational/directorate reorganizations were established to support a functional vs. survey centric view.

71. Impact on products and production: Recent initiatives to centralize the IT systems and create an enterprise system for data collection, processing, and dissemination of statistical data.

72. Difficulties while implementing: Institutional culture to view processes from an enterprise level vs. survey specific to meet the individual requirements.

73. Impact on work culture: Process orientation enabled employees to see similar processes once implemented to target potential areas for efficiency.

74. Lessons learned: The Census Bureau is in the midst of implementation, but one lesson learned is that this sort of change takes time and buy in from the top to the bottom of the organization.

3. Statistics Canada

75. Structural implementation: Statistics Canada undertook a major modernization project starting in 2009 that is entitled Corporate Business Architecture. Key principles are to be more efficient, robust and responsive to user needs. As part of the implementation (that is still ongoing) Statistics Canada identified several areas for improvement: aligning with GSBPM, centralizing specific functions (data collection, operations, IT), reducing the number of software/systems being built, and moving towards Service Oriented Architecture (SOA) and enterprise architecture. Statistics Canada initiated many modernization projects in waves to lead towards process improvement, and reorganized the organizational structure to support being more process-oriented.

76. Impact on products and production: Increased specialized expertise in collection, processing (business/social), IT, operations. Allows subject matter experts to focus on analysis and their area of expertise rather than operational activities. Financial resources that were saved due to being more efficient were reinvested in the organization's programs and to ensure ongoing quality maintenance.

77. Difficulties while implementing: Some resistance to change. Needed to ensure senior management support was unwavering. Significant investments were made in renewing computer systems and creating generalized tools for re-use.

78. Impact on work culture: The implementation of our modernization project created waves of concern when first introduced, but through senior management support and effective governance, modernization initiatives are moving forward towards full implementation.

79. Lessons learned: Unwavering senior management support is essential. It is important to explain to employees from the beginning why this is being undertaken, and what the impact will be. It is important to emphasize the ability of the organization to innovate through change, and that change can be positive. The communication is very important and never enough. Implementing change must be reinforced through project management rigour and monitoring. Appropriate governance, change management, prioritization and decision making must be put in place.

4. Statistics Finland

80. Structural implementation: By centralising all data capture (administrative data capture, survey operations) in a single unit; establishing the role of the process owner (Deputy Director General of Statistics Production) in the statutes.

81. Impact on products and production: Changes in the work processes and in the planning process (more centralized approach to development work).

82. Difficulties while implementing: It is not possible to implement the changes overnight, the establishment of the new organisational structure takes time and is done in steps.

83. Impact on work culture: Difficult to say yet, probably improved understanding of the work of colleagues in other units.

84. Lessons learned: To engage the whole organisation is challenging, especially the changing role of former domain-specific units has created tensions.

5. Statistics Norway

85. Structural implementation: Data Capture and Dissemination

86. Impact on products and production: Quality improvements across domains using the same process.

87. Difficulties while implementing: The individual statistics did not always feel that their individual needs were being met and/or prioritised enough.

88. Impact on work culture: More meetings and documented routines for cross-cutting processes.

89. Lessons learned: There needs to be more documentation of cross-cutting processes and of the interfaces between these and the rest of the organisation. New meeting places (physical and/or virtual) need to be established to discuss and plan cross-cutting issues.

6. Turkish Statistical Institute

90. Structural implementation: TurkStat designed its own version of statistical business process model using GSBPM. Procedures/methods that are used, step by step work flows, inputs and outputs of sub-processes, owners of the processes, the number of people required to do these tasks, software tools and other relevant metadata were collected from the subject matter departments. Documentation of processes and relationships between the processes is done according to the model; work flows are being modelled using a process modelling tool. The organisational structure was reorganised according to the TurkStat's Statistical Business Process Model. New functional divisions were created to coordinate cross cutting processes such as: metadata, standards, data collection, data analysis and administrative register systems. After the process-based reorganization was done, problems in the production processes started to be more openly discussed and evaluated.

91. Impact on products and production: Data production and dissemination systems have been standardised and new systems are built. A Data Documentation Initiative (DDI)[11] based IT tool was created and used for data collection and metadata. All business surveys and most household surveys moved into this new data collection environment so that all surveys would be using the same IT tool for data collection. Development of a new data processing and analysis module to be added to the new data collection tool started.

92. In 2012, a decision was made to standardise and maintain the metadata in one place. Code lists were brought together from all surveys. The variable names were listed and standardized according to the internally defined standard naming conventions. A catalogue of variable names was created for common variables. Control points were added to the processes in organizational structure to make sure that surveys comply with the new standards.

[11] Data Documentation Initiative (DDI) is an effort to create an international standard for describing data from the social, behavioral, and economic sciences; and expressed in XML.

93. As a result of these standardisations and the new systems, timeliness and effectiveness of data collection process are improved.

94. Process metadata became available to create new reports for senior management to help with their decisions.

95. Difficulties while implementing: Trying to change the culture of an organisation takes a long time. Becoming a process-oriented organization requires good coordination and strong teamwork culture within and across departments. The subject matter departments resisted the change first because of the extra work load during the transition period, but after seeing the benefits of the new systems and tools they started to support the change.

96. Impact on work culture: The senior management of the organisation supports the work on process management. However, the staff thinks that process documentation and standardisation creates a lot of extra work for them. Change in habits and work culture slowly began. Although there was some resistance to use new standard IT tools in the beginning, staff have become more adaptive to change.

97. Lessons learned: Think big but take small steps. The purpose of changes in organizational structure need to be communicated to the staff very well. The changes that are going to be made in the IT infrastructure have to be scrutinized and planned in detail before taking any steps. The departments have to be ready for more cooperation and teamwork. Change management is crucial to orchestrate the activities.

VI. Issues and challenges

A. Challenges at the international level

98. International models such as, GSBPM, GSIM, CSPA, Generic Activity Model for Statistical Organizations (GAMSO), Statistical Data and Metadata Exchange (SDMX) and DDI provide a base for standardisation of processes, metadata and statistical production systems in NSOs.

99. There is a widespread effort across NSOs to standardise processes and follow a more process-oriented organization of work. These efforts benefit from the internationally developed models for standardising and modernising statistical production. Adoption of these frameworks by statistical organizations improves the common understanding and alignment that is needed for joint development, sharing and re-use of components. However, the challenge is that development, adoption and implementation of these models takes time. NSOs are at different stages of modernization which could make the sharing and re-use of common tools difficult. Furthermore, it takes time to get feedback from countries on new standards and models so as to develop their feasibility.

B. Challenges at the national level

100. The experience of NSOs shows that they face many problems when trying to become more process-oriented. Achieving a global state of process-oriented official statistics industry would not be easy when each individual NSO has problems in standardising, streamlining and automating their processes.

101. The replies of NSOs to the question: "*What were the difficulties met while implementing and applying the process-oriented approach?*" provide insight into challenges met and help to identify key characteristics of the problems. NSOs reported

about many kinds of difficulties when improving process orientation, such as cultural and management issues, communication problems and lack of resources in terms of financial resources and skilled labour.

102. One of the key challenges in the transformation process is the institutional culture. There may be some resistance to change due to the necessity adapt to new roles and learn new tasks. Staff may find it difficult to view processes from the enterprise level as opposed to statistical domain level. The changeover period may be burdensome and demanding.

103. Another problem is how to manage the processes between different departments and how to clearly distribute authority. Reporting lines might get blurred in process-oriented structures (e.g. dual reporting lines in a matrix) and this could cause practical difficulties and duplication of effort. Senior management's support, clear communication among staff and a strong teamwork culture is essential to overcome these problems.

104. NSOs emphasized the lack of resources. Renewing the existing organization takes considerable amount of time and resources. Significant investments need to be made in IT systems; new skills are required both for statisticians and IT specialists. Renewing IT tools and retraining staff because of changing roles is costly and challenging.

VII. Conclusions and recommendations

A. Conclusions

105. There are intensive efforts at the national and international levels to modernize statistical production, many of these stressing the importance of process-oriented approach to statistical production.

106. In practice, the organization types of NSOs vary and different structures can be suitable for statistical production. Each NSO can design its organizational structure and processes in ways that match with their needs and priorities.

107. Process-oriented structuring is important, but changing the organizational structure may not be enough for introducing process orientation. It also requires fundamental changes in the work culture.

108. Process oriented approach gives employees a new perspective on how to do their work. Employees start looking at processes from a wider, institutional level as opposed to survey specific level. Process-oriented organizations start seeing similar processes as a potential area for standardisation (such as data collection, data editing, data processing and dissemination), whereas they used to be independently maintained and developed by each subject matter area.

109. The survey showed that data collection and dissemination are the process phases that NSOs most commonly standardise and automate. GSBPM or a national version of GSBPM is widely used by NSOs for process modelling, whereas the use of BPMN tools is not very common across NSOs. Many NSOs noted that they have not yet completed the standardisation and automation of all processes. Some NSOs mentioned that they have started process standardisation, and some indicated that they are in the middle of transforming the processes. Some had not yet started because of lack of time and resources.

110. The NSOs' experience shows that moving towards process orientation is a complex and difficult undertaking. The following provides a summary of issues that NSOs faced when implementing process orientation:

- Better understanding and more documentation of cross-cutting processes are needed.

- New skills are required for statisticians as well as the IT specialists.
- More investments have to be made to develop common IT tools for sharing and re-using.
- Better communication is necessary across organizational units.
- Teamwork is essential for process management.
- Commitment of staff and senior management is important.

111. Regardless the challenges, the work was considered worthwhile. If there is an organization wide support for change, the necessary investments and trainings are done, and if the organizational culture is open for change then the organization can become more agile and function more effectively and efficiently.

112. NSOs reported on many significant benefits as a result of developing a process-oriented approach to statistical production. The increased standardisation helped to reduce costs, allowed subject matter experts to focus on analysis rather than operational activities, reduced routines, improved timeliness and effectiveness of data collection. Financial resources that were saved could be more efficiently reinvested in the organization's programs to enable maintaining the required wide range of different statistical products and improving quality across statistics. The change helped to develop process phase-specific skills, e.g. IT skills which make a transition to updated technology more feasible.

B. Recommendations

113. It is not easy to make a clear definition of a "process-oriented NSO". Therefore, it is also a huge challenge to develop a process-oriented approach to statistical production. A Task Force to determine fundamental characteristics of process-oriented statistical production and basic requirements to achieving it would be valuable. The group could produce a simple and actionable "to do list" or a "check list" to be recommended to NSOs. NSOs could then use these resources as a guideline when aiming for a more process-oriented way of working.

114. More efficient sharing of experience would support those NSOs wishing to move forward. A wider compilation of NSOs' experience in the modernization and re-engineering of statistical production towards process orientation could be made and shared using a wiki knowledge base. Studying further the experience of NSOs that are applying a process-oriented approach to statistical production would also support the work of the suggested Task Force.

115. Collaboration across subject matter departments as well as the functional departments in organizations remains as a specific challenge and should be further enhanced at the national level. Therefore, practical advice on how to improve communication and collaboration to enable a well-functioning process-oriented approach could be discussed at the international level.

116. Increased collaboration between NSOs would be essential for improving processes and creating synergies to develop common methods, tools and systems. Efficient international collaboration would help to reduce the need to re-invent the wheel and to avoid duplication of effort across NSOs. To launch a more active discussion on the topic, the process-oriented approach to statistical production could be added to the list of possible topic for upcoming CES seminars.

117. The Bureau is invited to consider the way forward including:

(a) Determining characteristics and requirements of process orientation with a simple and actionable "to do list";

(b) Carrying out a compilation of NSO experience covering more countries and collecting material to a wiki knowledge base;

(c) Discussing the topic at a future CES seminar to find synergies across countries and identify additional areas for improvement, standardisation or automation of processes.

Annex

List of NSOs responded to the Survey on Process-oriented Approach to Statistical Production

1. Australian Bureau of Statistics
2. Bureau of the Census, USA
3. Central Bureau of Statistics, Israel
4. Central Statistical Bureau of Latvia
5. Central Statistical Office, Poland
6. Croatian Bureau of Statistics
7. Federal Statistical Office, Germany
8. Hungarian Central Statistical Office
9. Institut National de la Statistique et des Études Économiques, France
10. Institute of Statistics (INSTAT), Albania
11. National Statistical Committee of the Republic of Belarus
12. National Statistical Institute of the Republic of Bulgaria
13. National Statistical Office, Mongolia
14. National Statistical Office, Thailand
15. National Statistics Office of Georgia
16. State Statistical Committee of Azerbaijan Republic
17. State Statistical Office, the former Yugoslav Republic of Macedonia
18. Statistical Office of Montenegro
19. Statistical Office of the Republic of Serbia
20. Statistical Office of the Republic of Slovenia
21. Statistics Austria
22. Statistics Canada
23. Statistics Department of Economic Planning and Development, Brunei Darussalam
24. Statistics Estonia
25. Statistics Finland
26. Statistics Lithuania
27. Statistics Norway
28. Statistics South Africa
29. Statistics Sweden
30. The State Statistics Service of Ukraine
31. Turkish Statistical Institute